DOCUMENT RESUME

ED 231 471 JC 830 319

AUTHOR Moran, Terrence J.; Rosberg, William H.
TITLE The Effect of Personnel Policies on Faculty Composition and Cost at a Community College.
PUB DATE [83]
NOTE 19p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Age; *College Faculty; Community Colleges; Futures (of Society); Occupational Mobility; *Personnel Policy; *Predictor Variables; *Teacher Characteristics; *Teacher Salaries; Two Year Colleges
IDENTIFIERS *Kirkwood Community College IA

ABSTRACT

A study using the Markov chain model was conducted at Kirkwood Community College (KCC) in Iowa to predict the age and probationary status of faculty members over the next 20 years and to estimate the budget required to cover increased salaries associated with additional experience. The study predicted faculty composition under four alternative models: (1) current hiring and retention policies; (2) adoption of a policy to provide incentives for early retirement; (3) adoption of a policy to enforce more stringent guidelines on moving a faculty member from probationary to permanent status; and (4) adoption of a combination of these two policies. The Markov model, which traces faculty members' movement in the past and projects the same movement in the future, was applied to data for the years 1979-81 concerning the 148 KCC faculty eligible for membership in the state-defined professional bargaining unit. The study found the average age of KCC faculty to be 41.8 years in 1981 and their earnings to average $21,350. Over 18% of the faculty members were in the probationary period. Assuming the continuation of current policies, the average age of faculty in 1991 will be 45.1 years, with the proportion of faculty between 31 and 45 declining and the number over 51 growing. The total annual salary outlay will increase by $48,631 by 1991. Alternative policies were found to produce some variations in total salary outlay, but with smaller than anticipated cumulative differences. (Author/AYC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED231471

THE EFFECT OF PERSONNEL POLICIES ON FACULTY COMPOSITION AND COST AT A COMMUNITY COLLEGE

by

TERRENCE J. MORAN
WILLIAM H. ROSBERG

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
W. H. Rosberg

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.
☒ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

JC 830 319

ABSTRACT

The authors use a Markov chain model to predict age and probationary status of faculty members at Kirkwood Community College, Cedar Rapids, Iowa. The model predicts/projects such status for 20 years and also estimates budget required to cover increased salaries associated with additional experience.

Kirkwood Community College is used as an example. The model itself should be applicable to any two year institution having a master contract with certified staff and a 1-2 year probationary period.

Alternate models examined include:

1. Current hiring/retention policies.
2. Adoption of a policy to provide incentives for early retirement.
3. Adoption of a policy to enforce more stringent guidelines on moving a faculty member from probation to permanent status.
4. A combination of policies 2 & 3.

Difference equations used in development of the Markov Chain Model for use on a micro-computer are included.

Policy changes produce variations in total salary outlay but cumulative differences are smaller than the authors had anticipated.

Community colleges established during the expansion period of the 1960's will encounter numerous changes in the last two decades of the 20th century. The declining number of high school graduates and the ensuing slowing rate of growth in the number of faculty members required may cause a shift in the composition of community college faculties. To plan effectively college administrators need to anticipate the upcoming changes and study the impact of selected policy alternatives on their budgets and faculty composition. The Markov chain model is a useful tool to assist in the essential planning. Its application to a sample institution, Kirkwood Community College, Cedar Rapids, Iowa, shows possible faculty realingments and the projected impact of different personnel policies.

Kirkwood Community College is part of a state-mandated system of two year schools. It was established in 1965 offering initially a limited number of vocational-technical courses. Since that time it has expanded into a comprehensive community college with more than 60 vocational-technical programs, a full college transfer program and an active and aggressive Community Education Divison. Credit programs (both Arts and Sciences and Vocational-Technical) enrolled more than 5,000 students during the 1981-82 academic year.

Total population in the seven county service district of the college has been nearly stable for the past ten years. In spite of this stable base, the college has continued to grow in all categories, Arts and Sciences, Vocational-Technical and

Community Education. Even with this record of continued growth, both the demographic characteristics of the state and the condition of the economy indicate a probable slowing of the rate of institutional growth. This curtailed expansion rate, coupled with the weak demand nationally for college faculty members, has resulted in a slowdown in turnover rate.

Several methods are available to aid in manpower planning. A computer simulation approach used by Christopher Nevison (1980) allowed a large number of variables to be considered in the model. Hopkins (1974) used a Markov chain model but used six years of data and made special adjustments after testing the model. Regression techniques could also be used to predict future faculty composition. To study the trends of faculty change and their budgetary implications at Kirkwood Community College, a faculty flow model was developed from faculty hiring and termination data. A Markov model, developed from the data, was used to predict the age and probationary status of faculty members 20 years into the future and to estimate the additional budget required to cover increased salaries associated with additional experience. The same flow model was then modified to simulate the impact of alternative policies on hiring, probation and retirement.

The Markov model used in this study of Kirkwood Community College faculty was similar to Spinney & McLaughlin's model (1979) in their study of faculty members at a state university. The model was built by tracing faculty members'

movement in the past and projecting the same movement into the future. The assumption required for the analysis were: (1) that the probability of a faculty member entering a state after one year was a function only of the current state; and (2) that the transition matrix accurately reflected the situation at the time of the study. The personnel examined in this analysis were the 148 faculty eligible for membership in the state-defined professional bargaining unit. This included full-time vocational-technical and arts and science faculty, librarians, and counselors. Records on these faculty members were examined for the years 1979, 1980 and 1981. The matrix had the following categories:

- Probation - first year
- Probation - second year
- Non Probation
  - Under 26 years of age
  - 26 - 30
  - 31 - 35
  - 36 - 40
  - 41 - 45
  - 46 - 50
  - 51 - 55
  - 55 - 60
  - 61 and above
- Left institution
- Newly hired to institution

The data for the three-year period was sufficient to record faculty movement for two years. To develop the matrix each faculty member was placed in the matrix according to his/her movement from category to category from 1979 to 1980. The same procedure was done for the movement from 1980 to 1981. The final transition matrix percentages were computed by averaging the data from the two years. (Table 1.)

Table 1

ADJUSTED TRANSITION MATRIX

	Probation 1st. yr.	Probation 2nd. yr.	Under 26	26-30	31-35	36-40	41-45	46-50	51-55	56-60	Over 60	Leave Coll.
Probation 1st. yr.		.788										.212
Probation 2nd. yr.			.065	.161	.388	.193	.032		.032	.032		.097
Under 26			.50	.50								.0
26-30				.571	.286							.143
31-35					.717	.208						.075
36-40						.630	.259					.111
41-45							.702	.213				.085
46-50								.739	.174			.087
51-55									.750	.250		.0
55-60										.783	.130	.087
Over 60											.80	.20
New Employees	1.0											

Several small adjustments were needed in the data to allow the flow matrix to function properly in the interactive computer runs. The data on the individuals in 56-60 age category were adjusted to reduce the percentage staying in the category the following year to below 80 percent. Over a period of time an average of at least 20 percent must move from one age category to the next or leave the institution. During the period examined, 100 percent of the faculty members in the 61-65 age category retired. This anomaly of everyone who reaches age 61 retiring was corrected by reducing the retirement percentage to 20 percent. This percentage was selected by examining the past behavior of Kirkwood's employees over age 61.

The assumption that the size of the faculty would remain constant was adhered to by making a small adjustment in the starting point of a year. A year was assumed to end after replacements were hired for those faculty members who left.

The Transition Matrix (Table 1.) shows average movement of Kirkwood faculty members during the test period. The different equations used for the computer runs are listed in Table 2.

The flow model was developed not only to predict the age and probationary status of faculty members, but also to see the salary consequences of the changed composition of the teaching staff. The salary impact was measured by determining the average salary for each age and probationary category of employees and multiplying by the number in the categories in

Table 2

DIFFERENCE EQUATIONS USED
IN COMPUTER PROGRAM

$a_n = t_n$

$b_n = .788\ a_o$

$c_n = .065\ b_o + .5\ c_o$

$d_n = .161\ b_o + .\ c_o + .571\ d_o$

$e_n = .338\ b_o + .286\ d_o + .717\ e_o$

$f_n = .193\ b_o + .208\ e_o + .630\ f_o$

$g_n = .032\ b_o + .259\ f_o + .702\ g_o$

$h_n = .213\ g_o + .739\ h_o$

$k_n = .032\ b_o + .174\ h_o + .75\ k_o$

$p_n = .032\ b_o + .250\ k_o + .783\ p_o$

$r_n = .130\ p_o + .80\ r_o$

$t_n = .212\ a_o + .097\ b_o + .143\ d_o + .075\ e_o + .111\ f_o + .085\ g_o + .087\ h_o + .087\ k_o + .20\ r_o$

$v_n = a_n + b_n + c_n + d_n + e_n + f_n + g_n + h_n + k_n + p_n + r_n$

Where:		
a = probation 1st. yr.	a_o = 16
b = probation 2nd. yr.	b_o = 12.5
c = under 26	c_o = 1.5
d = 26 - 30	d_o = 7
e = 31 - 35	e_o = 27
f = 36 - 40	f_o = 25.5
g = 41 - 45	g_o = 24
h = 46 - 50	h_o = 3.5
k = 51 - 55	k_o = 8
p = 56 - 60	p_o = 11
r = 61 and above	r_o = 1.5
t = left institution	t_o = 16

each future year. The salary changes predicted by the model reflect only the increased salaries due to additional experience. Age does not serve as a perfect substitute for years of experience used on the salary schedule. It does have a close relationship to professional experience and to the salary increases earned by further educational advancement after the faculty members' initial employment.

In 1981, the average age of the Kirkwood faculty members was 41.8 years. Adjusting all contracts to equal length, they earned an average salary of $21,350. Eighteen and one-half percent of faculty members were in the probationary period. Those individuals between the age of 31 and 45 accounted for 50% of all faculty, while 15 percent were over 51 years of age. Ten percent of the faculty members left the college during the period. Only three faculty members retired during the years studied.

State law requires faculty members to be employed under probationary status for two years. Probationary status may be extended for a third year. In general, new faculty members move through the two years of probation and into permanent status without action being taken by college administrators to terminate employment. College administrators have not used the probationary period to selectively choose a percentage of new faculty members to move into permanent status. The Kirkwood Community College mandatory retirement age is set at 70 with

extention possible on a year by year basis. The Iowa Public Employees Retirement Program provides full retirement benefits after 30 years of service and age 65.

The model was used to predict the impact of various policy alternatives on the composition of the faculty and their salaries. The four policies examined for their impact were:

1. Retention of current policies on probation and retirement.
2. Adoption of a policy to provide incentives for early retirement.
3. Adoption of a policy to enforce more stringent guidelines on moving a faculty member from probation to permanent status.
4. A combination of 2 & 3.

In each of the runs of the data, fairly stable levels are reached after 10 years. Some of the greatest changes occur in the first five years. Twenty year results are listed in Table 3.

With the assumption of current policies (Model 1), the average age of faculty members in 1981 of 41.9 years will increase to 45.1 by 1991. The number of faculty members between 31 and 45 will decline from 50 percent to 41 percent by 1991 and the number over 51 will grow from 15 percent to 26 percent. The total annual salary outlay will grow by $48,631 by 1991. The cumulative sum of extra dollars spent on salaries due to changing age composition will be $358,586 during the ten year period.

Table 3

PERCENT OF FACULTY IN PROBATION AND AGE GROUPS 1982-2001

	1982	2001[1]	2001[2]	2001[3]	2001[4]
Probation 1st. yr.	10.12	10.38	10.86	11.44	11.98
Probation 2nd. yr.	8.55	8.16	8.55	9.0	9.43
Under 26	1.06	1.06	1.11	1.16	1.22
26 - 30	4.58	4.27	4.48	4.18	4.39
31 - 35	17.77	15.38	16.13	14.74	15.48
36 - 40	16.33	12.83	13.45	12.29	12.90
41 - 45	16.17	12.0	12.56	11.61	12.16
46 - 50	10.23	9.94	10.34	9.61	10.0
51 - 55	5.93	8.19	8.46	4.08	8.34
56 - 60	7.47	10.98	11.15	10.92	11.19
Over 60	1.78	6.91	2.90	6.95	2.92
Left college	10.12	10.38	10.86	11.44	11.97

1 - Policy 1 - Present condition

2 - Policy 2 - Retirement incentives

3 - Policy 3 - Stricter probation

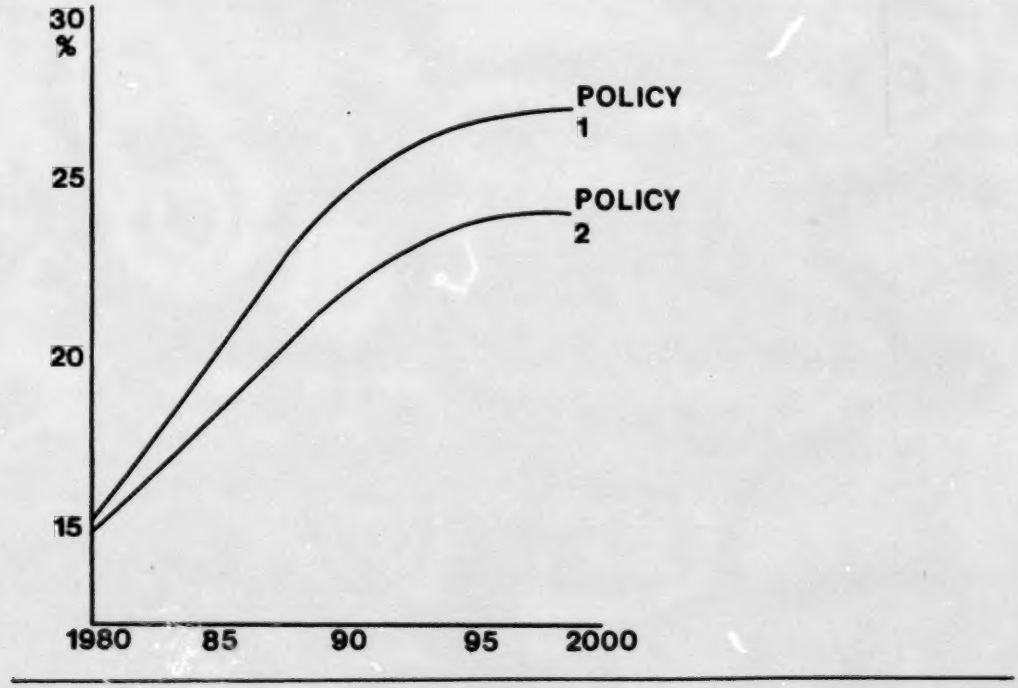
4 - Policy 4 - Combination of policies 2 & 3

Under the second policy assumption the transition matrix was adjusted to reflect earlier retirement. The "over 61" - "leave the institution" proportion was increased from .20 to .50

anually. As a result of the assumed successful incentives for retirement, the number of faculty members in the 51 and over group grew to 22.5 percent compared to 26 percent under present policies (Figure I). Under this revised policy the probationary group will grow by 1 percent and the 31-45 group will decline to 42 percent. The total additional salary commitment required until 1991 will be $203,209. The increased rate of retirement will save $155,375 over the present trend if no policy changes are adopted.

Figure 1

PERCENT OF FACULTY AGE 51 AND ABOVE
UNDER DIFFERENT POLICIES



The model shows that if the college administrators would adopt stricter standards for moving new staff members off probation (Policy 3) there would be only a slight increase in the percentage belonging to the probationary group (18.6 percent to 19.8 percent). The 31-45 age group would change from 50 percent to 39 percent by 1991 and the percentage of faculty members in the 51 and over age group would increase from 15 percent to 24 percent. These data were generated by changing the proportion of second year probationary faculty members leaving the institution from .097 percent to .20. The total salary increases due to the increasing age of faculty members would be $291,432, $67,154 less than that associated with no policy change.

Under the fourth policy, the flow model incorporates both changes made in policies two and three. With these changes, the total additional salary cost for the 1981-1991 period will be $138,499 compared to the $358,586 under policy 1. In ten years the probationary group will grow from 18.6 percent to 20.8 percent. the 31-45 age group will decline from 50 percent to 40.6 percent and the 51 and above group will increase from 15 percent to 22.5 percent.

The various versions of the Markov flow models used in this study reveal several useful predictions. If the Kirkwood Community College hiring, promotion, termination and retirement policies are left unchanged, the average age of faculty members will grow by 3.3 years and the average salary by $350 during the

next ten years. The total outlay on salaries due to increased age and education will be $357,586 during the same ten year period. The percentage of the faculty in the middle age group will decline by 10 percent while the number over 51 will grow by 10 percent. None of the policy alternatives of the magnitude used in this study produce much change in the proportion of faculty members in the various age groups from those predicted under present policy. Under the retirement incentive policy the 51 and above group will be only 2 and 1/2 percent smaller than under the present policies. The number in the 31-45 age group would be about 2 percent larger. None of the policies produce much change in the number of faculty members leaving annually. This can be explained by the fact that 70 percent of the faculty who leave do so immediately after the first year or substantially before retirement age. Therefore tougher probation standards or encouraging retirement produces only a small change in the leaving patterns.

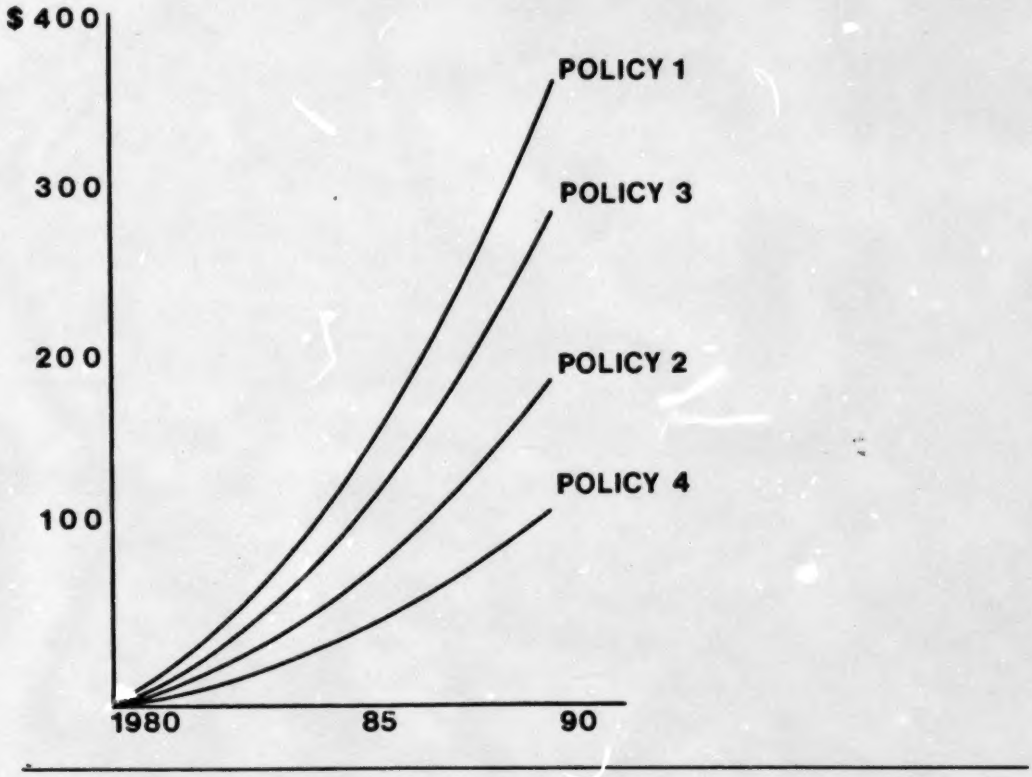
The various policies do produce differences in the total additional salary outlay through 1991. The existing policy is the most costly at $358.586. Policy 2 will cost $203.209, policy 3 $291,432 and policy 4 will cost $138,499 (Figure 2).

College administrators could use a portion or all of the savings under policies 2 and 4 to provide incentives for early retirement. In addition to possible budgetary benefits from policies 2 and 4, the more rapid retirement could serve to allow the hiring of staff members better able to meet changing needs

of the college or to facilitate staff reduction.

Figure 2

TOTAL CUMULATIVE SALARY INCREASE ASSOCIATED WITH CHANGING AGE COMPOSITION UNDER FOUR POLICIES (THOUSANDS)



Care needs to be taken in the interpretation of the data gathered in the examination of Kirkwood Community College. The predictions are based on data from 1979-1981. Many economic or demographic factors could produce different trends during the next few years. No distinction has been made between Arts and Sciences and Vocational Technical faculty members. A perusal of

the data suggests that turnover in Health Occupations and Data Processing are much higher than in the Arts and Sciences and in other Vocational programs. The aggregate data may hide quite different faculty characteristics within the various departments of the college. The budget data also should be looked at with caution. Past salary adjustments which rewarded years of work at Kirkwood may not be repeated thus the increased cost of older faculty members may not be as large.

All of the techniques used suffer from the weakness of being unable to predict future events which would significantly alter faculty member movement. However, each of them can provide meaningful insights into the effects of policy change under given faculty responses. The models help to clarify potential policy effects and to highlight important variables in the planning process.

BIBLIOGRAPHY

Hopkins, David S.P. "Analysis of Faculty Appointment, Promotion and Retirement Policies." Higher Education, 3 (1976), 397-418.

Nevison, Christopher H. "Effects of Tenure and Retirement Policies on the College Faculty." Journal of Higher Education, 5:2 (1980), 151-166.

Spinney, D.L. and G.W. McLaughlin. "The Use of a Markov Model in Assessment of Alternate Faculty Personnel Policies." Higher Education, 11:3 (1979), 249-62.

ERIC Clearinghouse for Junior Colleges
8118 Math-Sciences Building
University of California
Los Angeles, California 90024

AUG 5 1983